International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 0625/5

PAPER 5 Practical Test

MAY/JUNE SESSION 2001 1 hour 15 minutes

Candidates answer on the enclosed answer booklet.
Additional materials:
As listed in Instructions to Supervisors

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer booklet.

Answer **all** questions.

Write your answers in the spaces provided on the answer booklet.

You are expected to record all your observations as soon as these observations are made. These observations and any arithmetical working of the answers from them should be written in the answer booklet; scrap paper should **not** be used.

An account of the method of carrying out the experiments is **not** required but you should record any precautions you take, and it must be clear (by diagrams or otherwise) how the readings were obtained. The theory of the experiments in **not** required.

At the end of examination, hand in only the answer booklet.

INFORMATION FOR CANDIDATES

Graph paper is provided in the enclosed answer booklet. Additional sheets of graph paper should be used only if it necessary to do so.

This question paper consists of 7 printed pages, 1 blank page and an inserted answer booklet.

[Turn over

1 In this experiment, you are to determine the volume of a drinking straw by two methods.

Record all of your observations and answers on page 2 of the Answer Booklet.

METHOD 1

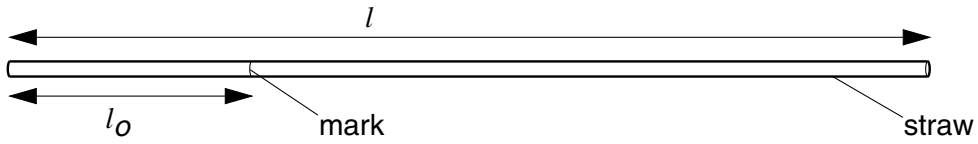

Fig. 1.1

Carry out the following instructions, referring to Fig. 1.1.

(a) Measure and record l, the length of the drinking straw.

(b) Measure and record l_0, the distance between the mark on the drinking straw and the end of the straw nearer to the mark.

(c) Insert the marked end of the straw into the beaker containing water, so that the water surface inside the straw is level with the mark.

(d) Close the top of the straw with your thumb or finger.

(e) With your thumb or finger still closing the straw, remove the straw from the beaker. Transfer the water in the straw to the measuring cylinder.

The volume of water that you have transferred to the measuring cylinder is too small to measure accurately. You will repeat the process described in steps **(c)** to **(e)** a counted number of times.

(f) Transfer more water until there is sufficient in the measuring cylinder to give a more accurate result. Record V_t, the volume of water in the measuring cylinder. Also record N, the total number of times that you transferred water from the beaker to the measuring cylinder.

(g) Calculate V_0, the volume of the straw between the mark and the end of the straw nearer the mark. Show your working clearly.

(h) Calculate V, the internal volume of the straw, using the equation

$$V = V_0 \times \frac{l}{l_0}$$

METHOD 2

(a) Using the thread provided and the metre rule, determine **as accurately as possible** c, the external circumference of the straw. Record your working and answer.

(b) Record l, the length of the straw, as already measured for method 1.

(c) Calculate V, the volume of the straw, using the equation

$$V = 0.08 \times l \times c^2$$

2 In this experiment, you are to determine the power dissipated in lamps.

Record all of your observations and answers on page 3 of your Answer Booklet.

Carry out the following instructions, referring to Fig. 2.1 and Fig. 2.2.

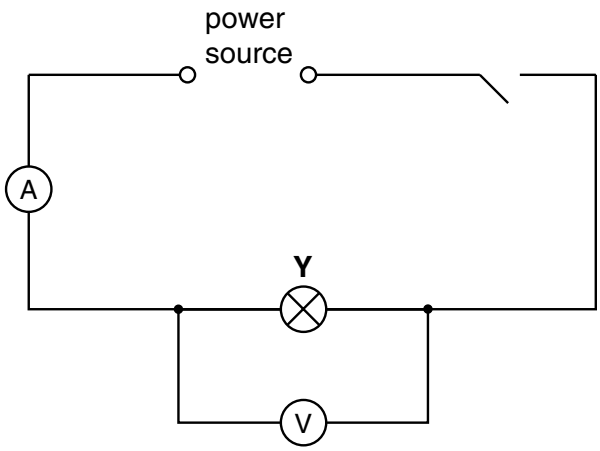

Fig. 2.1

The circuit shown in Fig. 2.1 has been set up for you, using lamp **Y**.

(a) Switch on. Measure and record in the table the current I through the lamp and the p.d. V across the lamp. Switch off.

(b) Calculate the power P of the lamp, using the equation

$$P = VI$$

Record this value of P in the table.

(c) Replace lamp **Y** with lamp **Z**. Repeat the procedure in **(a)** and **(b)**, recording the corresponding values of I, V and P in the table.

(d) Complete the column headings in the table by inserting the appropriate units in each of the I, V and P columns.

(e) Set up the circuit with lamps **Y** and **Z** connected in series, as shown in Fig. 2.2.

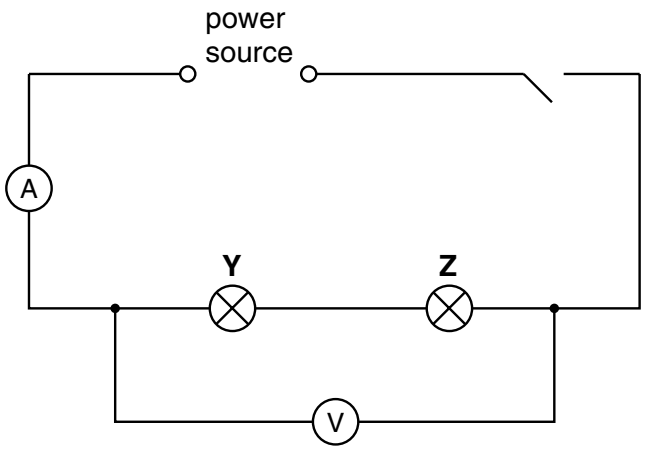

Fig. 2.2

(f) Switch on. Measure and record in the current I and the p.d. V across both lamps. Switch off.

(g) Calculate the power P of the two lamps when connected in series, using the equation

$$P = VI$$

Record this value of P in the table.

(h) Draw a circuit diagram showing

- the two lamps connected in parallel,
- the voltmeter connected to measure the p.d. across the lamps,
- the ammeter connected to measure the total current passing through the two lamps.

(i) Set up the circuit described in **(h)**.

(j) Switch on. Measure and record the current I and the p.d. V.

(k) Calculate the power P of the two lamps using the equation

$$P = VI$$

Record this value of P in the table.

(l) If the power source for each of the circuits with two lamps were a dry cell and you left the circuits switched on until the cells completely ran down, which circuit would stop working first: the series circuit or the parallel circuit? Justify your answer by reference to your results.

3 In this experiment, you are to investigate the extension of a spring.

Record all of your observations and answers on pages 4 and 5 of the Answer Booklet.

Carry out the following instructions, referring to Fig. 3.1.

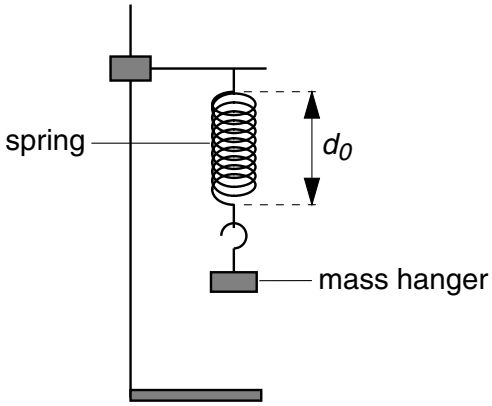

Fig. 3.1

The apparatus shown in Fig. 3.1 has been set up for you. The hanger shown is to take up slack in the spring. Any *extra* load added to the hanger is called the additional load *L*.

(a) Measure d_0, the length of the spring, as shown in Fig. 3.1. This is the length of the spring when only the mass hanger is hanging from it. Record d_0, in mm, in the table.

(b) Add a 1 N weight to the hanger. Measure *d*, the length of the extended spring, and record it in the table.

(c) Calculate *e*, the extension using the equation

$$e = d - d_0$$

Record *e* in the table.

(d) Repeat steps **(b)** and **(c)** until you have added a total of five 1 N weights.

(e) Plot a graph of *e* / mm (*y*-axis) against *L* / N (*x*-axis).

(f) Use your graph to find the extension that would be produced by an additional load of 3.6 N. Show clearly on the graph how you obtained the necessary information.

4 In this experiment, you are to determine a quantity called the refractive index of the material of a transparent block.

Record all of your observations and answers on page 6 of your Answer Booklet. The ray trace sheet is on page 7 of the answer booklet.

Carry out the following instructions using the ray trace sheet on the pin board and referring to Fig. 4.1.

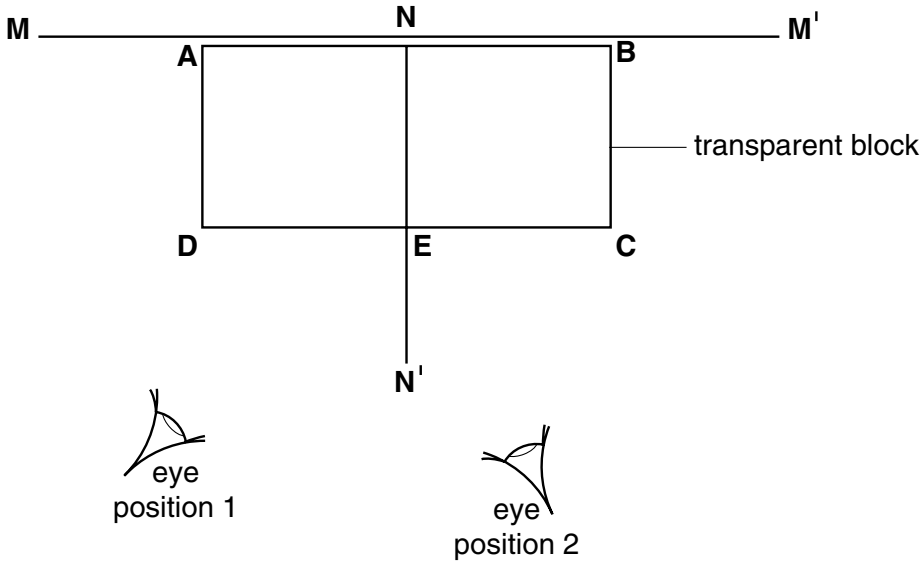

Fig. 4.1

(a) Place the transparent block flat on the ray trace sheet along the line **MM'** so that the vertical line on the block is at point **N**.

(b) Draw the outline of the block, **ABCD**, as shown in Fig. 4.1.

(c) Label, with the letter **E**, the point where the line **NN'** cuts the line **CD**.

(d) With your eye at 'eye position 1' shown in Fig. 4.1, look through the block so that you can see the vertical line.

(e) Push a pin $\mathbf{P_1}$ into the pin board on, or close to, the line **DC**. Place a second pin $\mathbf{P_2}$ between your eye and **the pin** $\mathbf{P_1}$ so that it hides the pin $\mathbf{P_1}$ and the vertical line. Label the positions of $\mathbf{P_1}$ and $\mathbf{P_2}$.

(f) Remove the pins and the block.

(g) Draw a line through $\mathbf{P_1}$ and $\mathbf{P_2}$ and continue the line until it meets **NN'**. Label the position **F** where the line meets **NN'**.

(h) Measure and record the distance **EF**.

(i) Measure and record the distance **EN**.

(j) Calculate *n*, the refractive index of the material of the block using the equation

$$n = \frac{\mathbf{EN}}{\mathbf{EF}}$$

(k) With your eye at 'eye position 2' shown in Fig. 4.1, look through the block so that you can see the image of the vertical line.

(l) Repeat the procedure in **(e)** – **(j)**.

(m) Calculate the average value of the refractive index from the two values that you have obtained.

BLANK PAGE